



Sustainable Bioenergy  
Solutions for Tomorrow

# **SUSTAINABLE BIOENERGY SOLUTIONS FOR TOMORROW (BEST)**

A joint research program by FIBIC Ltd. and CLEEN Ltd.

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Spinverse Oy



# BEST program – Creating the big picture of the bioenergy field



Source: MTT

**Technologies**  
*Pyrolysis, gasification, torrefaction, fermentation, combustion...*

**Strategies and policies**

**Bioenergy markets, investments and financing**

**Biomass feedstocks, potential and mobilization**

**Sustainability**

**Bioenergy carriers**  
*Chips, pellets, biomethane, biodiesel, bioethanol...*

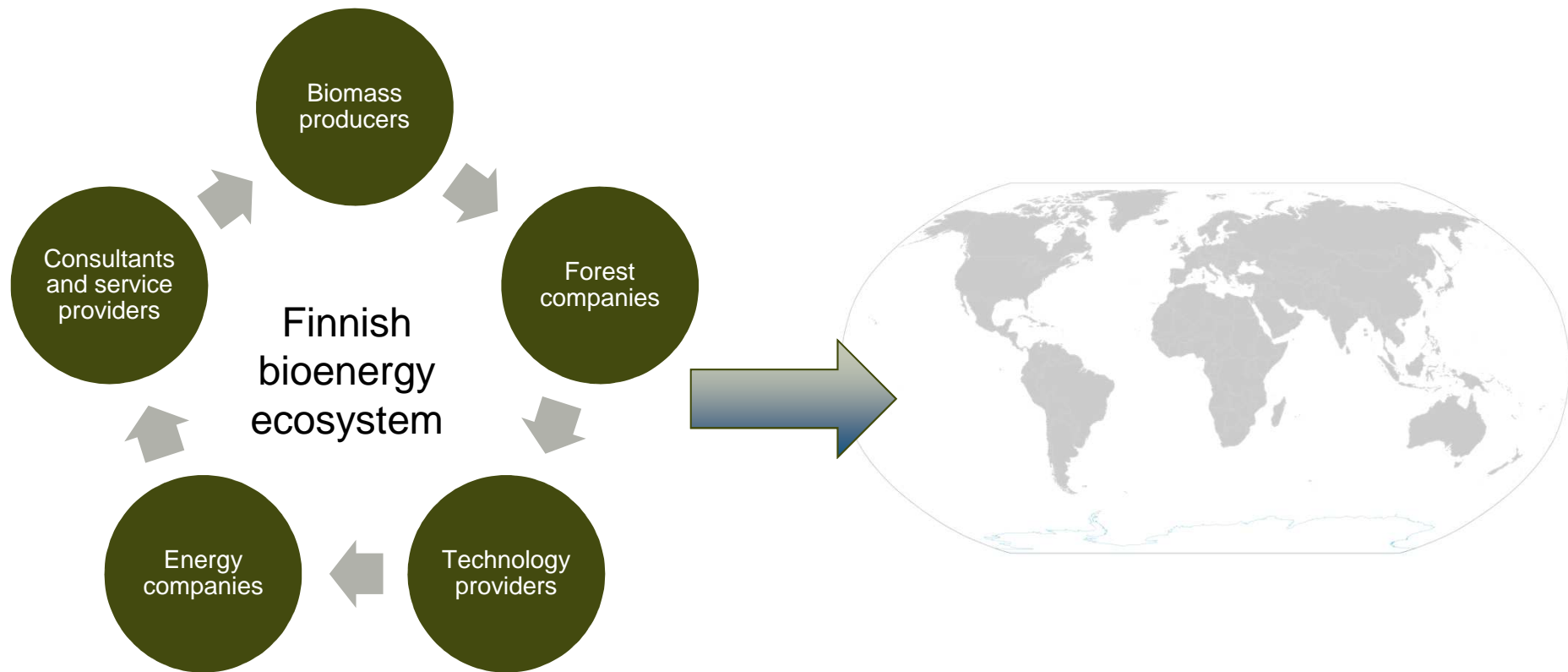


Source: Andritz



# BEST vision

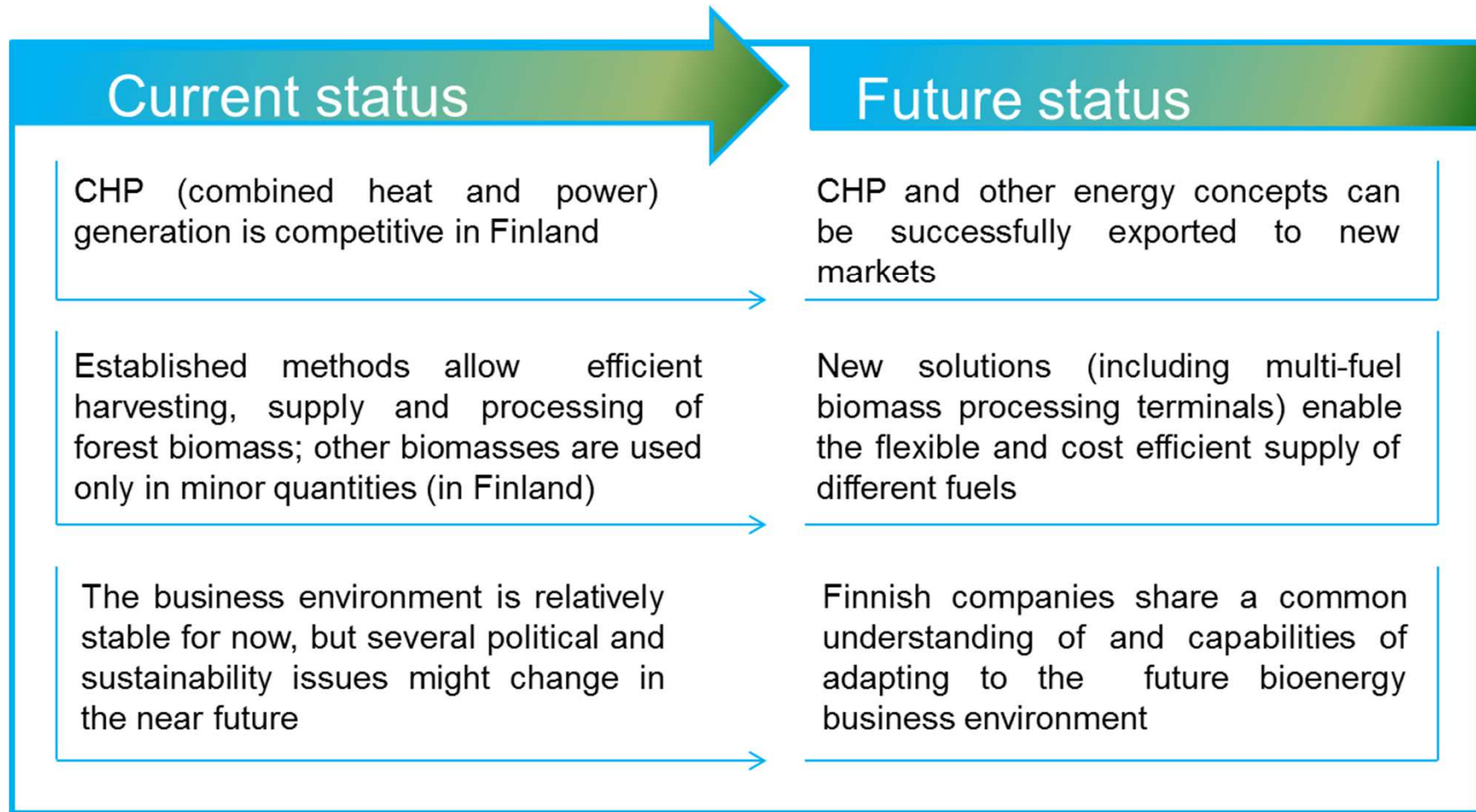
Finnish bioenergy actors cooperate as a bioenergy ecosystem and have world-class know-how that can be used as competitive advantage in seizing global bioenergy opportunities





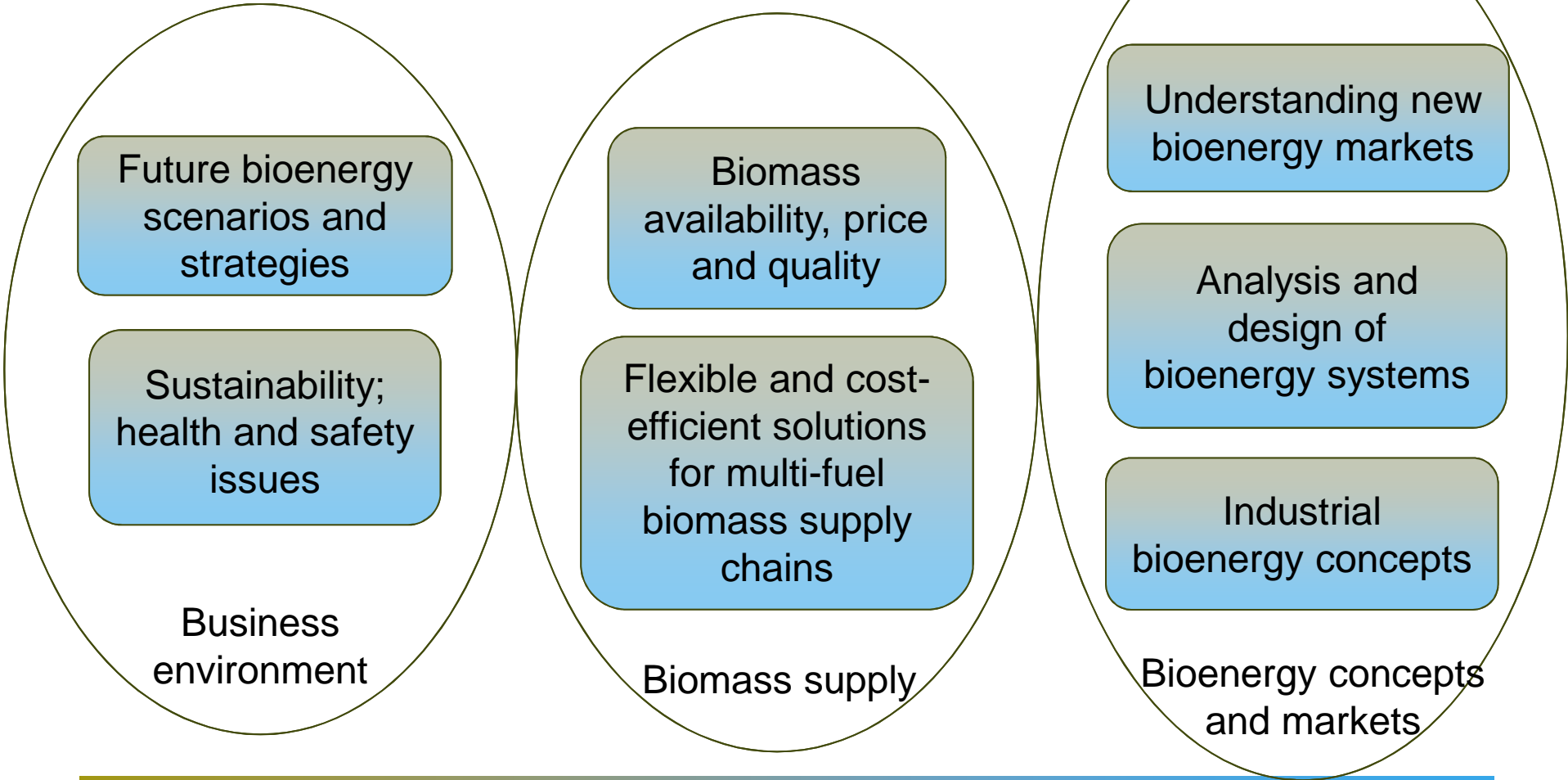
# The main objectives of the program

- Joining the strengths of the energy and forest sectors





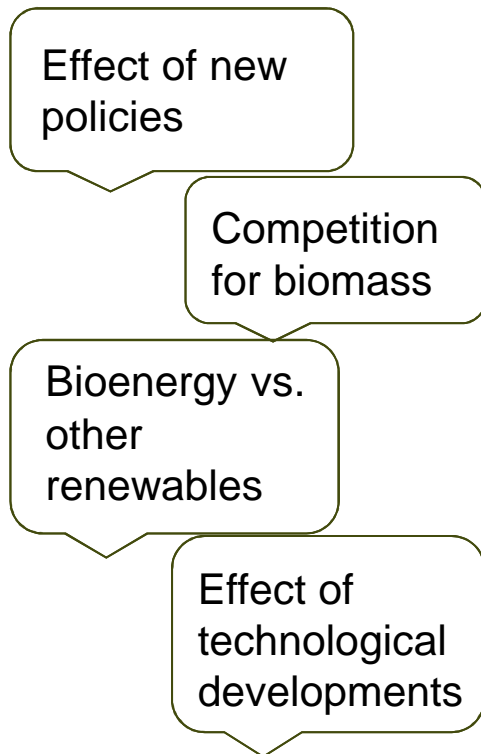
# BEST research areas





# Focus area 1: Understanding the future business environment

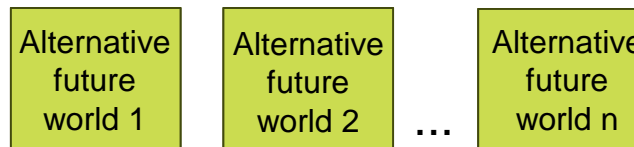
## Key issues:



## Research methods:

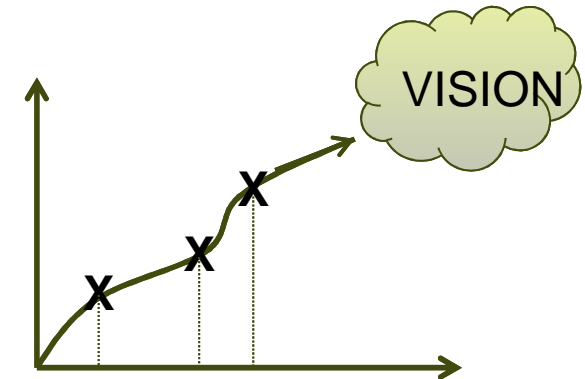


A critical and systematic summary of existing information



Creation and analysis of new visions and scenarios

## Outcome:



A roadmap for successful Finnish bioenergy business, incl. action plans and checkpoints

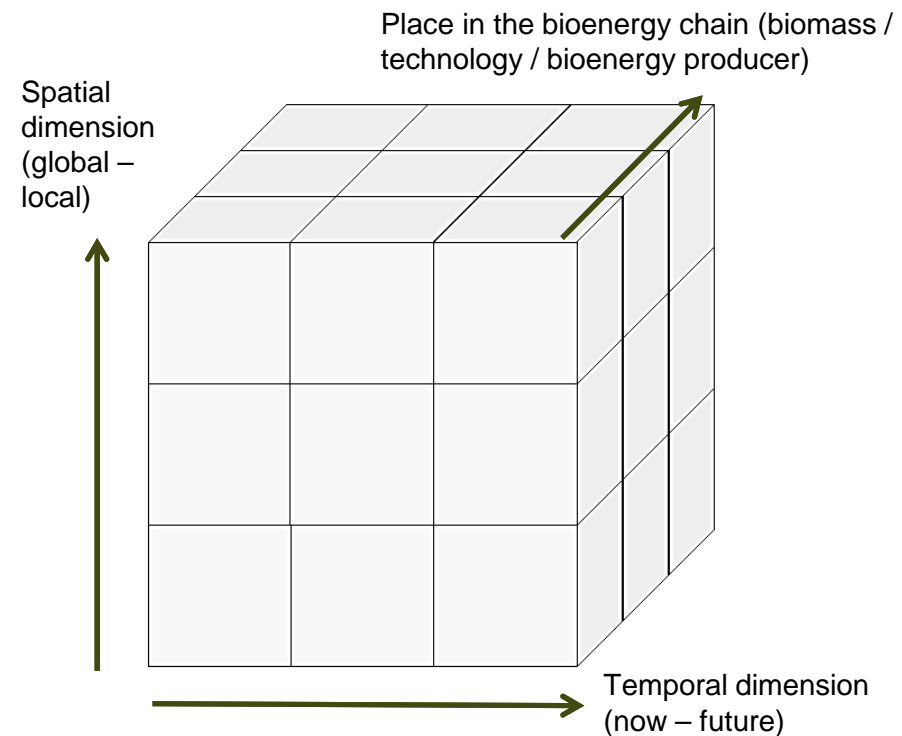


## Focus area 2 – Sustainability

Goal: Creating a systematic framework for defining and assessing the overall sustainability of different bioenergy chains, taking into account the different dimensions of sustainability:

- Economic
- Environmental
- Social

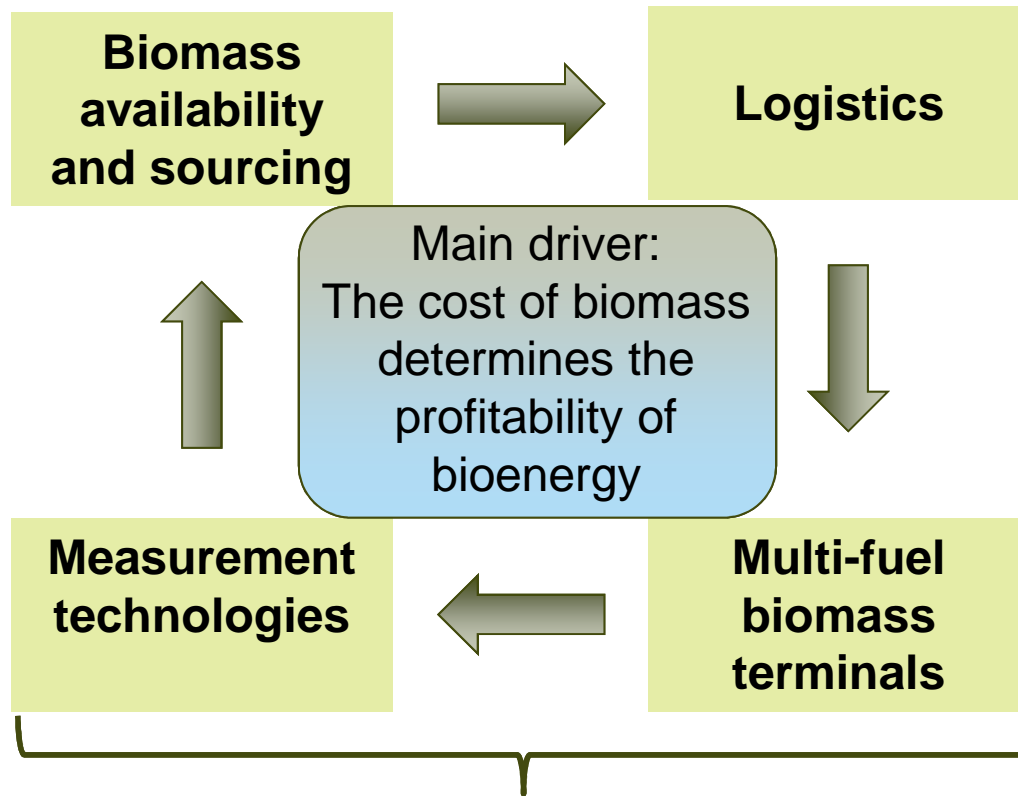
Expected business impact: A set of approaches that companies can use for both defensive (reactive) and proactive sustainability strategies



The basic framework for assessing the sustainability of bioenergy. (Source: LUT)

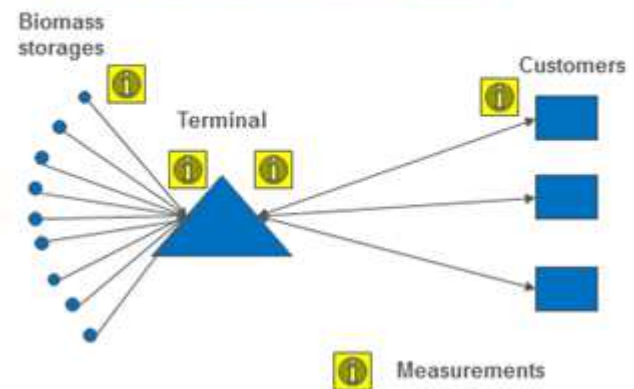


# Focus area 3: Radical improvement of bioenergy supply chains



Targets: Cost-efficiency, flexibility, improved quality, efficient information management

Biomass supply system: one potential terminal case







# Focus area 4: Understanding new markets to boost opportunities for bioenergy export

A thorough understanding of new markets and their business environment is a prerequisite for creating successful export concepts



Biomass transportation in India. Source: VTT

- **Case areas:** India, Poland, Germany, Baltic Sea area...
- International partners of the program:
  - India: TERI, IFSON
  - IEA Bioenergy
  - Ongoing discussion with Argentine partners



# Why use India as a case country for bioenergy?

Biomass sources in India:

|                       | Area (Mha) | Biomass Generation (Mt/a) | Biomass Surplus (Mt/a) |
|-----------------------|------------|---------------------------|------------------------|
| Agricultural residues | 287        | 511                       | 145                    |
| Forest                | 64         | 89                        | 60                     |
| Wasteland             | 54         | 66                        | 44                     |

“India is set to overtake China in the 2020s as the principal source of growth in global energy demand.”

“China and India together build almost 40% of the world’s new power generation capacity.”

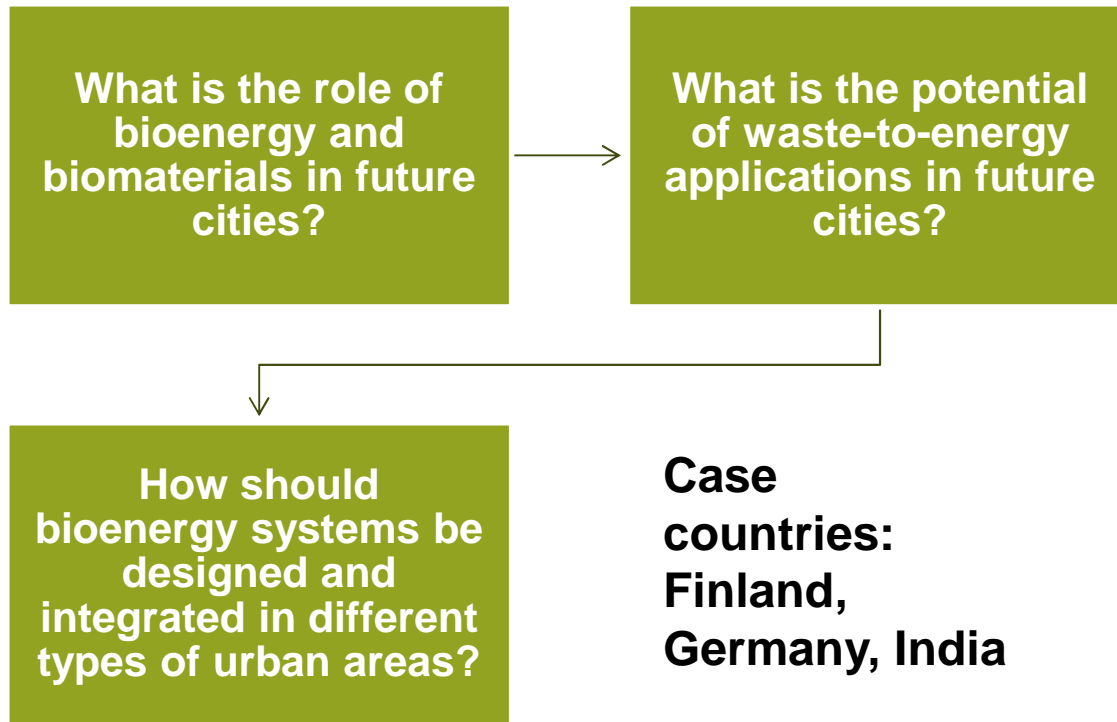
- World Energy Outlook, IEA

Source: Biomass Resource Atlas of India, <http://lab.cgpl.iisc.ernet.in/atlas/Default.aspx>



# Focus area 5: Urban city bioenergy concepts

**Main driver:** The most likely future bioenergy application environment is a big city.



**Case countries:  
Finland,  
Germany, India**



Mumbai



# BEST partners

21 companies, 13 research organizations



## Two phases of BEST: 2013-14 and 2015-16

- The volume of the program is about 4 MEUR annually
- The current research areas and content are set until the end of 2014
  - The research needs of the latter phase will be determined based on the results and knowledge created in the first phase



Photo: Stora Enso



Photo: MTT



Photo: Andritz



## Contact information

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  - <http://www.cleen.fi/en/best>
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